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This beautiful and, to the writer, unusual covering of the nest was quite sufficient to invite still closer examination, and the most unusual feature was yet to be discovered. On drawing down the supporting branches to facilitate closer inspection, I was surprised to observe the tail and wing-tips of a bush-tit projecting from the side of the nest a couple of inches to the left of the entrance. Upon investigation I found that one of the little nest builders, for some reason which seems difficult to explain, had apparently attempted to tunnel through the side of the nest and, becoming entangled in the net-like structure to such extent that it could not free itself, had perished. The bird was thoroughly dried when found, so the nest was brought in and photographed (see fig. 49). The tail and wings of the dead bird will be seen projecting from the nest a little to the left of the entrance.

The nest contained five eggs, three of which were broken. They had apparently been deposited at least two weeks previously, which would indicate a rather early nesting date for the species.

Los Angeles, California, May 6, 1914.

ON THE OOLOGY OF THE NORTH AMERICAN PYGOPODES

By DR. R. W. SHUFELDT

WITH FIVE PHOTOS BY THE AUTHOR

TAKEN collectively, the loons and grebes form a natural Supersuborder of birds, created to contain the Suborder *Pygopodes*, which latter is represented by two families, namely the *Colymbidae* or Grebes, and the *Gaviidae* or Loons.

In my paper on "An Arrangement of the Families and Higher Groups of Birds," which appeared some time ago in *The American Naturalist* (vol. xxxviii, nos. 455-456, Nov.-Dec., 1904), the loon family bore the name of *Urinatoridae*, which, be it known, is co-equal with the family here called *Gaviidae*; while the grebes, formerly called the *Podicipidae*, are, as an assemblage, now known as the *Colymbidae*. This constant changing of names, though doubtless necessary, is very inconvenient and confusing for the ornithologists of the present day; and every one will surely rejoice when avian nomenclature eventually becomes *fixed*.

For years the common loon was known as *Colymbus torquatus*; and now *Colymbus*, in modern American ornithological works, is only applied to the grebes, while the loons are all relegated to the genus *Gavia*. Why the last-named, as a family (*Gaviidae*), should, in a Suborder (*Cepphi*), be arrayed with the auks (*Alcidae*), as is the case in the classification adopted in the last edition of "The A. O. U. Check-List of North American Birds," is, to me, quite incomprehensible. Morphologically, a grebe and a loon are very much alike; while a loon is, structurally, quite a different bird from any species of auk known to me.

In the present article I am to present some notes I have made and illustrated with photographs of the eggs of our grebes and loons, much as was done in another contribution of mine, which appeared in a former issue of THE CONDOR¹, devoted to the eggs of the North American limicoline birds.

1. SHUFELDT, R. W. An Introduction to the Study of the Eggs of the North American Limicolae. THE CONDOR, vol. xv, no. 4, July-August, 1913, pp. 138-151; illustrated by 54 reproductions of photos of eggs of the shore-birds.

For the material used in the present connection I am again indebted to Mr. E. J. Court of Washington, D. C., from whose fine collection of eggs most of it has been selected, and also to the United States National Museum for the loan of three exceptionally beautiful eggs of our Common Loon (*Gavia immer*), here figured in nos. 11-13. All the photographs of the eggs illustrating the present article are reproductions of those made by myself, direct from the specimens shown, and all are natural size on my negatives.

It will not be necessary to list here the grebes and loons known to occur in our avifauna, for they are familiar to ornithologists everywhere. The eggs of all of them have been examined and compared by me during the preparation of the present paper, with the exception of the eggs of the Yellow-billed Loon (*Gavia adamsi*), no specimens of the eggs of which are to be found in either of the above referred to collections; I shall refer to this matter again farther on in this article.

Throughout the early literature of the grebes in this country, there exists no little confusion in regard to the American species, a statement that may, in most instances, be extended to include the descriptions of their nests and eggs. They are better known now, and the first form here to be noticed is the Western Grebe, the *Podiceps occidentalis* of Lawrence and the *Æchmophorus occidentalis* of the A. O. U. Check-List. It has a wide range through western North America, occurring as far south as central Mexico.

No descriptions of grebes are found in Wilson's "American Ornithology", though five species of them are listed at the end of the "Brewer's Edition" of that work.

Audubon's accounts of our grebes are scanty and of but little value. The most elaborate one is devoted to the Crested Grebe ("*Podiceps cristatus*"), a bird not found in North America, but which he claims to have met with in numbers over the greater part of the United States in his time. Ridgway says of this bird in his *Manual*: "Nearly cosmopolitan, but no authentic record for any portion of America" (p. 5).

To return to *Æ. occidentalis*, the last-mentioned writer does not describe its eggs in the work named, simply stating: "Eggs 2-5, 2.40 x 1.54." Not a word as to their form or color.

With respect to this, Coues gives a general description of the eggs of the North American grebes, intended to cover those of all our species, thus: "The eggs are more numerous than in other pygopodous birds, frequently numbering 6-8; elliptical, of a pale or whitish unvariegated color, and commonly covered with chalky substance."² He says, in the case of *Æ. occidentalis*, that they are "usually 3-5 in number, measuring 2.40x1.55."

Of this species Reed says: "They lay from three to five eggs, the ground color of which is a pale blue; this color is, however, always concealed by a thin chalky deposit, and this latter is frequently stained to a dirty white. Size 2.40 by 1.55."³

Of the seven or eight eggs of the Western Grebe before me, I find the average measurement to be almost exactly 2.40x1.55, though this varies some-

2. COUES, E. Key to North American Birds, vol. II, fifth edition, p. 1053. He gives a separate description for the eggs of *Colymbus auritus*, and states that those of *C. n. californicus* cannot be distinguished from them (p. 1058).

3. REED, CHESTER A. North American Birds Eggs. New York, 1904, p. 1. A good figure of the egg of *Æchmophorus* is given; and, as a matter of fact, this excellent book is beautifully illustrated all the way through with reproductions of photographs of the vast majority of the eggs of United States birds and many of their nests, etc.

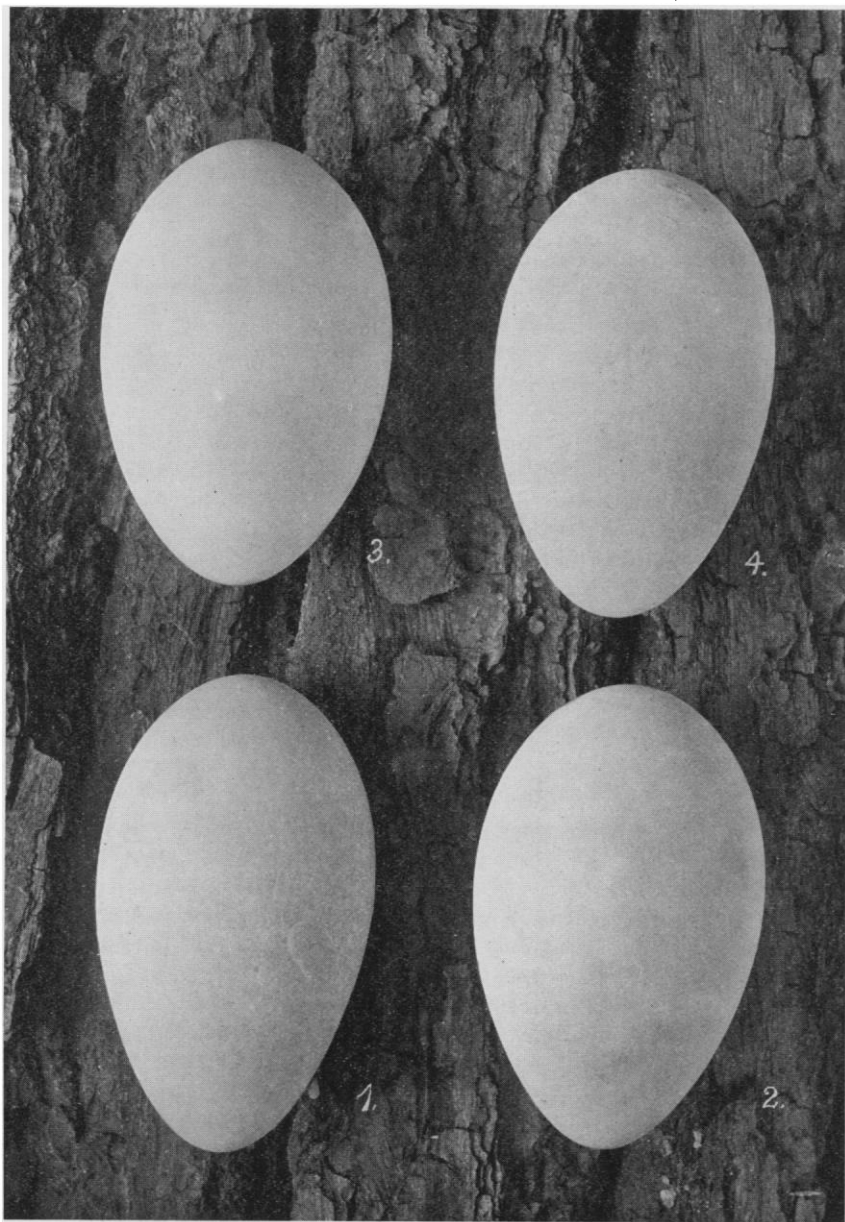


Fig. 50. NOS. 1 AND 2, EGGS OF THE WESTERN GREBE (*Aechmophorus occidentalis*); NOS. 3 AND 4, EGGS OF THE HOLBOELL GREBE (*Colymbus holboelli*); ALL NATURAL SIZE.

what for individual eggs, as does also the form in different specimens. As to the white, chalky deposit, it by no means always obscures the pale blue ground color of the egg, for in some the layer is extremely thin, while in others it may have been more generously applied or deposited on the surface, sometimes even in heavy circumscribed blotches (see no. 2).

Two eggs of this grebe are given in figure 50 with this article (nos. 1 and 2); they are from the Court collection, and were taken by A. O. Treganza at Utah Lake, Utah, on the 29th of May, 1904 (set mark 29-4). Mr. Treganza, who resides at Salt Lake City, describes the nest as being a "platform of reeds, partly floating, partly resting on broken-down reeds; nest proper composed of decayed reeds. Water three to six feet deep."

The colony of grebes, where these eggs were collected, was located about two miles from the shore, and contained about one hundred nests. Some of the clutches were in advanced incubation. Eggs from the other nests are before me, but their characters are the same as those already given for the specimens shown in the figures.

Passing to *Colymbus holboelli*, a grebe of which I have several eggs at hand belonging to the Court collection, it is to be noted that they very closely resemble those of the Western Grebe just described (fig. 50, nos. 3 and 4). They are, however, somewhat smaller, a fact noted by Ridgway in his *Manual* ("Eggs 2-5, 2.23x1.37," p. 5.)

Coues on the other hand says, in the last edition of his "Key": "Eggs 2-5, sometimes more, oftener 3 or 4, 2.10-2.35x1.51-1.45, rough, whitish, either inclining to pale greenish or with buffy discoloration, of the narrow-elongate shape usual in this family" (p. 1056). That they are not always of the "elongate shape," will be appreciated by comparing nos. 1 and 3 of this paper. The "buffy discoloration" is to be attributed to stains due to coming in contact with the decaying vegetation composing the nest. Mr. William B. Arnold collected the eggs of the Holboell Grebe shown in nos. 3 and 4 of fig. 50 (Manitoba, Canada, June 15, 1910).

Reed, in his above cited book, says of the eggs of the Holboell grebe: "They lay from three to six eggs of a dingy white color which have the stained surface common to Grebes' eggs, size 2.35x1.25." Those shown in nos. 3 and 4 of the present article are somewhat larger than this, though very slightly so. There is considerable chalky deposit on no. 4, while no. 3 has hardly any, and is of a very pale greenish shade.

I have not illustrated the egg of the Horned Grebe (*Colymbus auritus*), but a specimen of it is shown in Reed's "North American Birds' Eggs" (p. 2), and he says in regard to this species: "They build a typical Grebe's nest, a floating mass of decayed matter which stains the naturally white eggs to a dirty brown. The number of eggs varies from three to seven. Size 1.70x1.15."

To represent *Colymbus nigricollis*, I have selected eggs of the Eared Grebe (*C. n. californicus*), and two of these are shown in fig. 51, nos. 7 and 8. They are typical for this species, and I have several of them at hand from Mr. Court's collection. Mr. A. M. Ingersoll took them at Lake San Jacinto, Riverside County, California, on the 8th of June, 1897. At the time they were collected there were many nests there with eggs of this bird in sight. The floating nests were attached to growing grass in about fifteen inches of water (set mark 2021, no. 4).

Coues says of the eggs of this grebe that they are "not distinguishable from those of *C. auritus*" (p. 1058); while Reed (*loc.*

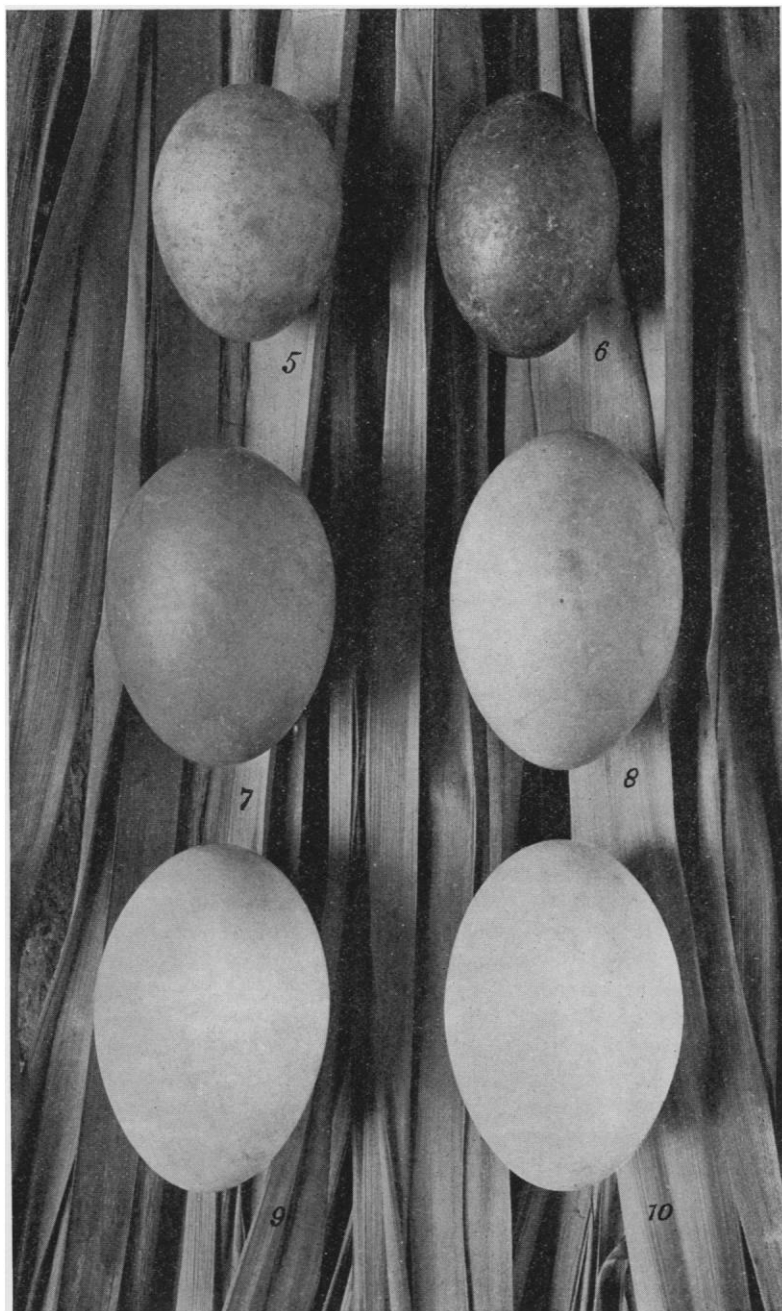


Fig. 51. NOS. 5 AND 6, EGGS OF MEXICAN GREBE (*Colymbus d. brachypterus*); NOS. 7 AND 8, EARED GREBE (*C. n. californicus*); NOS. 9 AND 10, PIED-BILLED GREBE (*Podilymbus podiceps*); ALL NATURAL SIZE.

cit.) says that the eggs of *C. n. californicus* are "bluish white, with the usual chalky and discolored appearance," and he gives the size as 1.75x1.20. Ridgway does not describe them, simply stating "Eggs 4-8, 1.75x1.10."

Audubon had but confused ideas about our smaller grebes and their eggs, so it is quite useless to cite him as an authority on these interesting birds.

Nos. 7 and 8 here figured are of a pale clay color, no. 7 being three or four shades darker than no. 8. Possibly they may be stained in the usual way; but they do not appear to have any chalky deposit upon them, and they vary somewhat in shape. No. 7 measures 1.61x1.24, and no. 8 1.75x1.19, while other eggs of this subspecies at hand average somewhat smaller in size.

Eggs of the Mexican Grebe (*Colymbus dominicus brachypterus*), here shown in fig. 51, nos. 5 and 6, are often of an earth brown color and blotched; others are lighter, but still exhibit the same blotched or marbled appearance on a light clay ground. As usual, they vary in form and size. No. 5 measures 1.40x1.00. Reed gives the average size as 1.40x.95, and there is a specimen in Court's collection which is exactly of that size.

Frank B. Armstrong of Brownsville, Texas, collected nos. 5 and 6, and others also at hand (May 26, 1906). It was near his home, and a large colony of the birds were associated together. Their nests were composed of decayed grass and weeds. The eggs described by Reed (*loc. cit.*, p. 3) were taken by the same inveterate collector on the same date as above, and Reed gives the color as "deep buff or rich brown," which is correct. Clutch 3-5.

Coues did not describe the eggs of this subspecies; but of the extralimital grebe, *Colymbus dominicus*, he says: "eggs usually 7, 1.35x0.95," without giving either their color or form (*loc. cit.*, p. 1058).

Our Pied-billed Grebe or Dabchick (*Podilymbus podiceps*), the eggs of which are here shown in fig. 51, nos. 9 and 10, breeds in various regions throughout North and South America, being very rare in some localities; its eggs have been very differently described by various writers on ornithology.

Audubon apparently never discovered but one nest of this bird—or what he supposed to be this bird—and it contained five eggs. He describes them as measuring "an inch and a quarter, by seven and a half-eighths," and they were "smooth, rather rounded, and of a light greenish-white colour." With respect to the color, he was about right; but I have never seen a "rather rounded" grebe's egg, and his measurements are certainly away off.

Coues says not a word about their color or form, stating simply: "Eggs 4-6 or more, 1.70x0.95" (*loc. cit.*, p. 1059).

Reed gives their color as "deep buff"; the clutch 5-9, and the size as 1.70x1.18 (*loc. cit.*, p. 5). There are four of these eggs before me, taken from a set of five (set mark 9-5). They were collected by Dan Spencer in Iowa ("Town Cr. Bluff") on the 13th day of June, 1895. "Nest of mud and rushes floating in water." (See fig. 51, nos. 9 and 10.) I find these eggs to be of a pale greenish-white, with little or no chalky deposit upon them whatever. As usual, they vary somewhat in form and size, measuring upon the average 1.70x1.19, individual specimens being either a little larger or somewhat smaller than this, and some being rather more elongate than others.

There can be no question in regard to the morphological similarity between the loons of the genus *Gavia* and the grebes; and, structurally, a loon is much nearer *Colymbus* than it is to any auk (*Alca*, etc.). With respect to the eggs laid by the representatives of the genus *Gavia*, however, they are all very

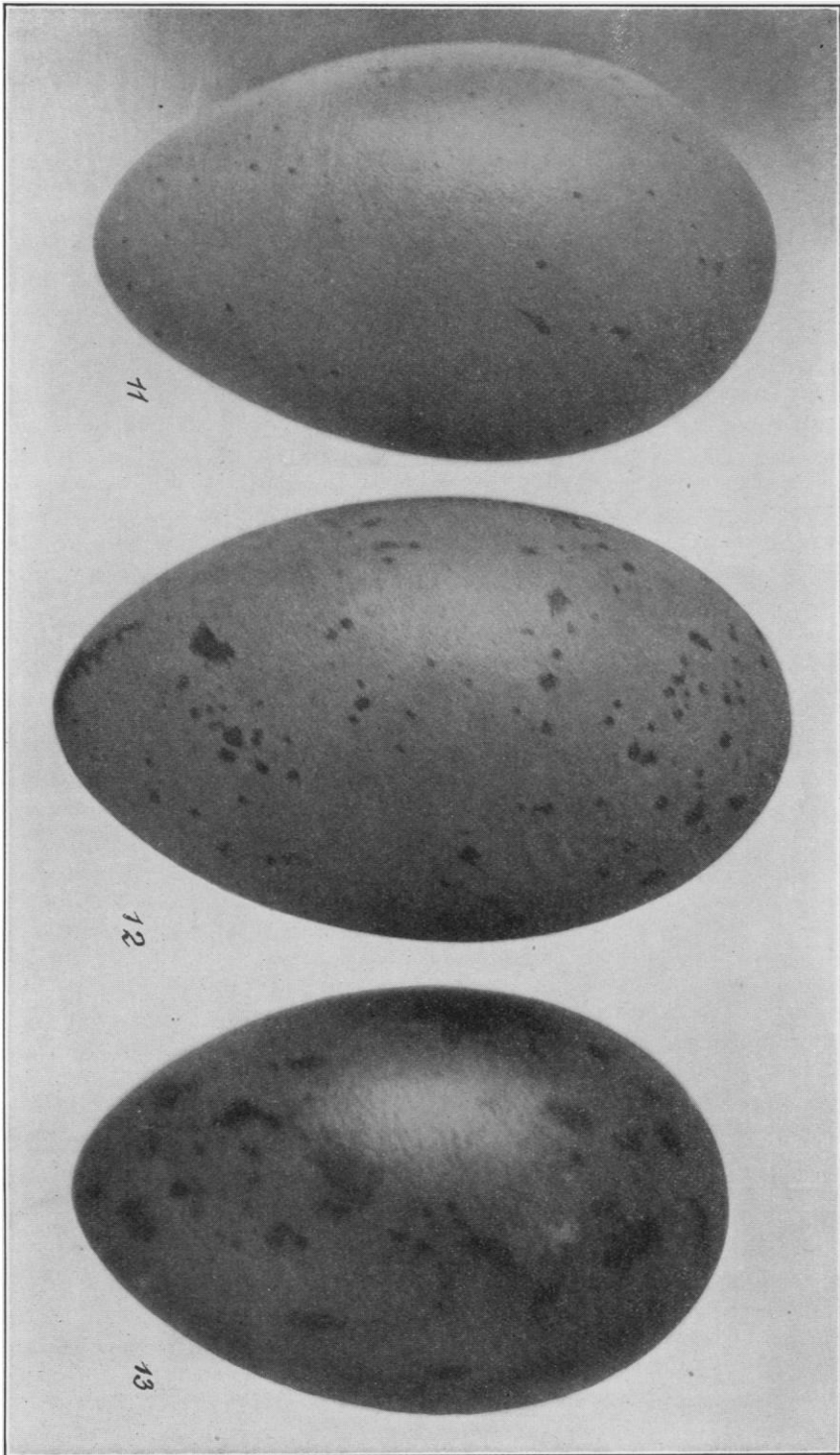


Fig. 52. EGGS OF THE COMMON LOON (*Gavia immer*), COLL. U. S. NATIONAL MUSEUM; ALL NATURAL SIZE.

different from any of those laid by the grebes, in so far as I have studied them.

Loon's eggs never show any chalky deposit upon them, the shells being more or less glossy and rather thick. In color, they range all the way from a clear drab to a deep vandyke-brown. They may be finely speckled all over with a black-brown, never thickly, or, what is more commonly the case, the spots are large and irregular, in some specimens amounting to heavy blotches. They are extremely difficult objects to photograph, owing to the glossy shells and the markings and ground color both being shades of brown, thus rendering it difficult to bring out the spots. The series of figures of loons' eggs in Reed's book, cited above, are excellent exemplifications of the difficulties in question. Some of the markings in those figures, as fine as they are in some respects, have evidently been touched up with a brush prior to reproduction from the photographs.

In figure 52 (nos. 11, 12 and 13) I present three illustrations of Common Loon's eggs (*Gavia immer*), kindly selected for me from the elegant collection of the U. S. National Museum by Dr. Charles W. Richmond of the Division of Birds of that Institution. They were photographed by me, natural size, and they well represent the extreme of ground color and markings as well as range.

No. 11 was taken in the Adirondack region, New York, and the collector is not known to me (coll. U. S. National Museum, no. 28300). This is the most remarkable loon's egg I have ever seen; it is of a rich olive-drab color, very sparsely flecked with very fine brown specks; it measures 3.51x2.25.

The beautiful specimen shown in no. 12 is considerably larger (coll. U. S. National Museum, no. 17977), as it measures 3.80x2.31; it is elegantly spotted with scattered spots of different sizes of a uniform blackish-brown as shown in no. 12. This egg was collected by George A. Boardman at St. Stevens, New Brunswick; it is a very different looking egg from the one shown in no. 13 of the same figure, which not only is of a much deeper brown, but the blackish-brown markings are, in many instances, much larger, while the egg itself is much smaller, being but 3.48x2.23 (coll. U. S. Nat. Mus., no. 24038, nat. size). This specimen was collected near New Cumberland House, Canada, by Mr. R. McFarlane.

In the coloring of these eggs of *G. immer*, there is a subtle shade of olive present, and this will account for Reed saying that the ground color of Loon's eggs is of a "dark greenish brown" (*loc. cit.*, p. 7). This writer gives, in the book cited, fine, natural-size illustrations of the eggs of *G. immer*, *G. adamsi*, *G. arctica*, *G. pacifica* and *G. stellata*, in fact, all of the species occurring in the avifauna of this country.

I have, in the present paper, figured only those of the Black-throated Loon (*G. arctica*), and the Red-throated species (*G. stellata*), for the reason that, in as much as all the eggs of the different species of our loons so closely resemble each other, I thought it more important to invite attention to variations in form, color and markings in the eggs of one or two species selected from series. This has been successfully accomplished in figures 53 and 54 (nos. 14-19), where the examples shown are all of natural size.

Almost without exception, the loon lays two eggs to the clutch and the markings in the case of *Gavia immer* are never, in so far as I have examined them, most numerous at the larger end. Audubon, in his account of the "Great Northern Diver" (Common Loon), says: "Of the many nests which I have examined, I have found more containing three than two eggs, and I am confi-

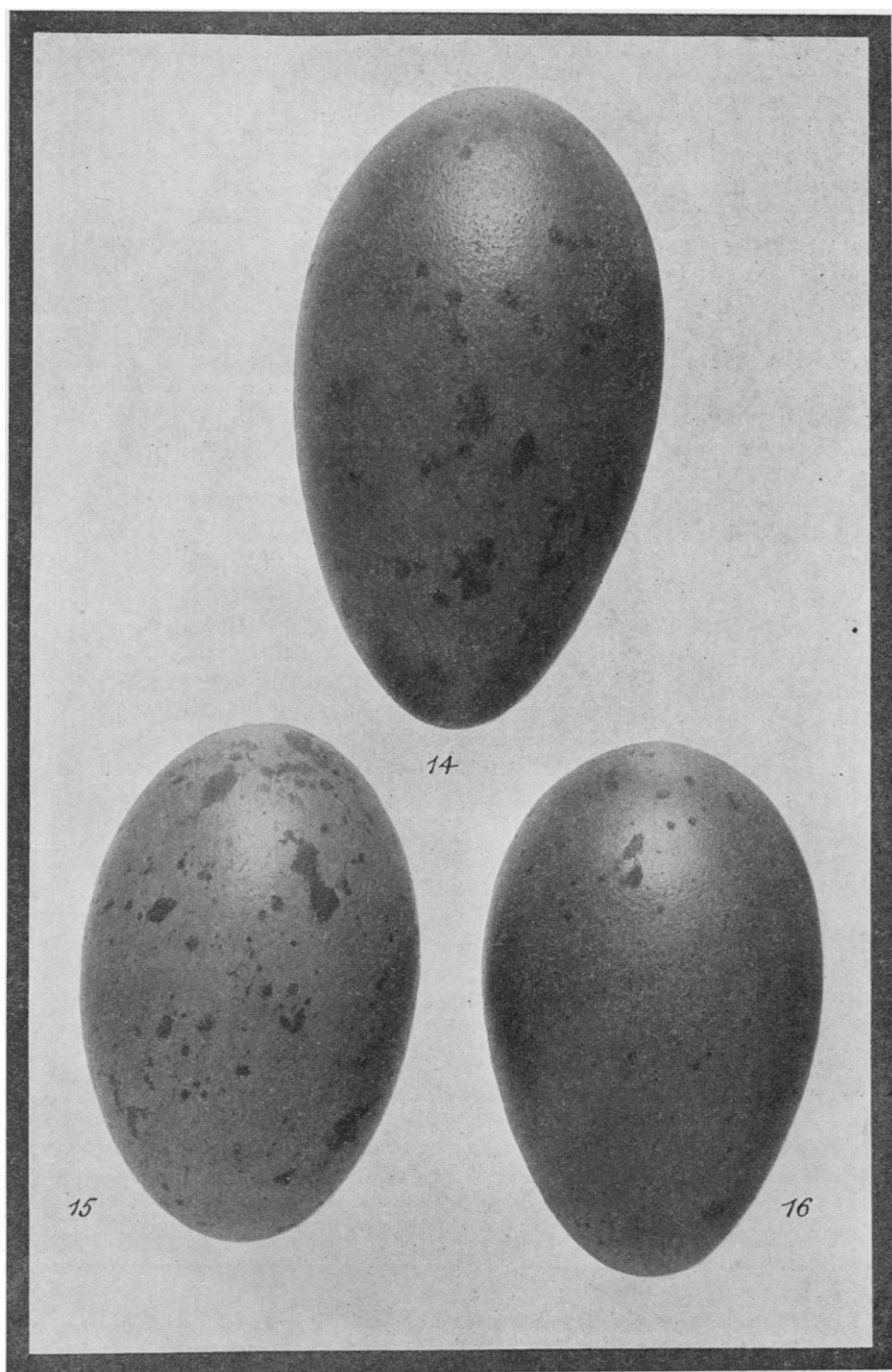


Fig. 53. NO. 14, EGG OF THE BLACK-THROATED LOON (*Gavia arctica*); NOS. 15 AND 16, THE RED-THROATED LOON (*Gavia stellata*); ALL NATURAL SIZE.

dent that the former number is that which more frequently occurs, although many European, and some American writers, who probably never saw the nest of this bird, allege the contrary. The eggs average three inches and three-quarters in length, by two inches and a quarter in their greatest breadth, and thus are considerably elongated, being particularly narrowed from the bulge to the smaller end, which is rather pointed. They are of a dull greenish-ochry tint, rather indistinctly marked with spots of dark umber, which are more numerous toward the larger extremity" (vol. VIII, p. 168). This description would be excellent were it not for the fact that he has the usual number to the clutch wrong, the average size wrong, and the form, color and markings all wrong; otherwise it is pretty good.

Coues says for this bird: "Eggs usually 2, 3.50x2.25, elongated and pointed, dull greenish-drab, with dark brown and blackish spots" (*loc. cit.*, pp. 1049-1050). This description might apply to some few eggs of *Gavia immer*, but by no means to them all. It is a dangerous practice to publish blanket descriptions of birds' eggs, as it is with respect to much else constituting biological material.

Reed says of the eggs of the Loon: "The two eggs which they lay are a very dark greenish brown in color, with black spots. Size 3.50x2.25" (p. 7). How about no. 11 of figure 52 of the present article?

The same author says of the eggs of *Gavia adamsi* that it lays two eggs "size 3.60x2.25," and that in the case of this species "their nesting habits and eggs are precisely like the preceding (*G. immer*), except that the latter average a little larger," in all of which he is very probably correct. Of *G. pacifica* he also says "they lay two eggs of a greenish brown or greenish gray hue with black spots. Size 3.10x1.90" (*loc. cit.*, pp. 9 and 10).

The eggs here shown in fig. 53 are from Mr. Court's collection and came to me accompanied by the following data: No. 14, *Gavia arctica*. Collector (?); Fornea, Lapland, 14 June, 1909. Set 2. Set mark 20. This egg measures 3.18x2.00.

No. 15. *Gavia stellata*, Oefusa, Iceland, 12 June, 1910 (35.49.2). I find the specimen to measure 2.80x1.80, which is somewhat above the average size for this species.

No. 16. *Gavia stellata*, Oefusa, Iceland, 2 June, 1910 (38.34.2), a specimen which I find to measure 2.80x1.80. All three of these are of a deep greenish olive ground, deepest in no. 14, lightest in no. 15, with blackish brown spots distributed as shown in figures. There is no disposition for these spots to especially congregate at the larger end in the case of any of these eggs, this being but slightly evident in nos. 15 and 16, but not at all so in the case of no. 14.

Coues does not refer to either the color or the markings of the eggs of *Gavia stellata*; he simply says: "Eggs 2-3, 3.00x1.75." As to the ground color, I may say that there is a great similarity with respect to it among all species of loons of the genus *Gavia*.

Variations in size and form, as found in the case of loons' eggs, is well shown for the Red-throated Loon (*G. stellata*) in fig. 54 (nos. 17-19). These interesting examples are also from Mr. Court's collection and bear the following data: No. 17, Oefusa, Iceland, 12 June, 1910 (38.92.2), an unusual form of egg, which I find to measure 3.02x1.74.

No. 18 was collected by A. W. Johnson on the 20th of May, 1874, at Orford, North Iceland. There were two in the clutch, and I find it to measure 3.00x1.81.

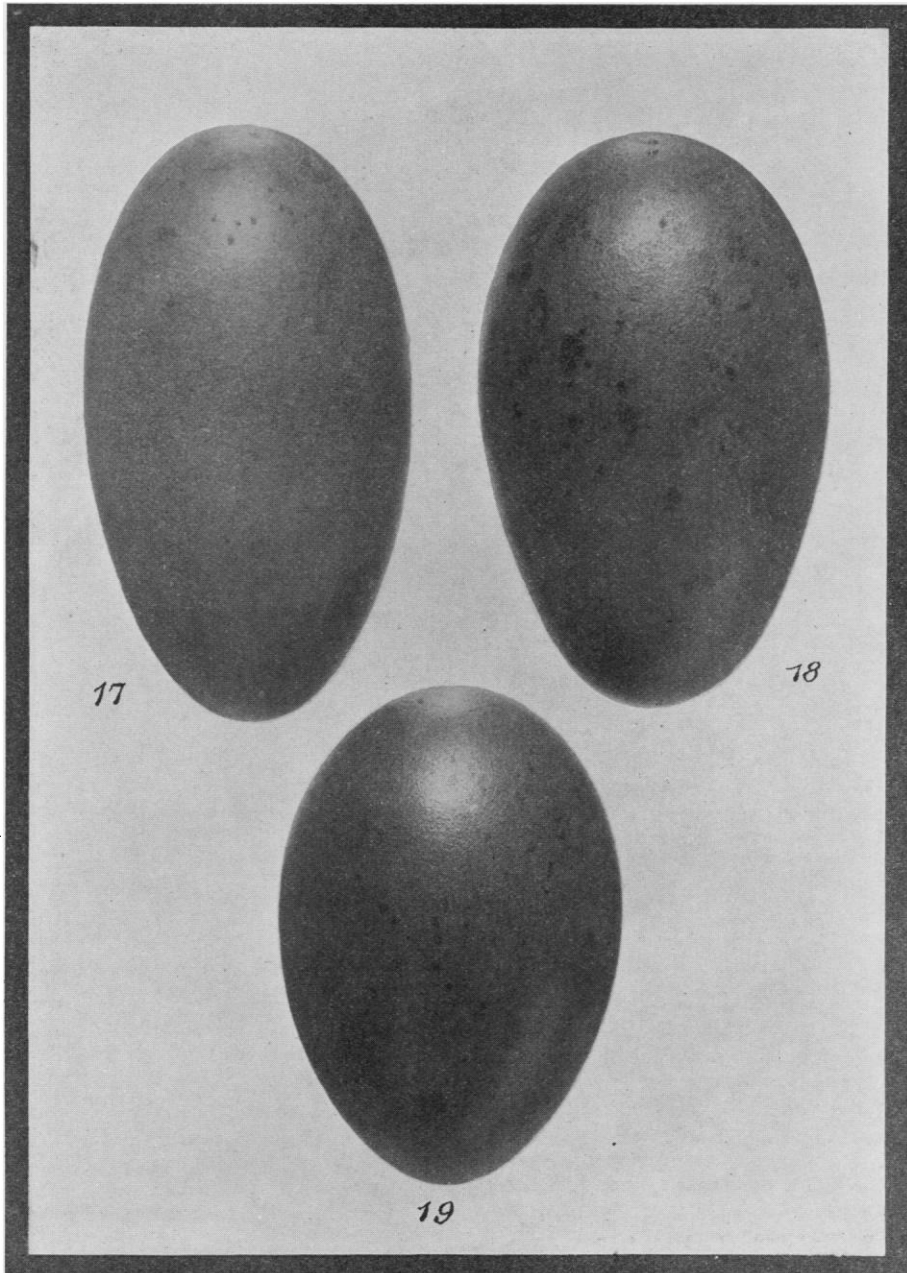


Fig. 54. EGGS OF RED-THROATED LOON (*Gavia stellata*), NATURAL SIZE, SHOWING VARIATIONS IN SIZE AND FORM.

No. 19. Collected by Paul Thorasimsson, on the 15th of June, 1905, at Lake My Vatn, North Iceland (set c 1-2), measures, according to my measurements, 2.60x1.80.

Nos. 18 and 19 are both very dark eggs, while no. 17 is lighter. In the case of no. 19 most of the spots are very fine, even minute, with only a few larger ones. In no. 18 they are larger and blacker, those at the greater end being, in fact, great blotches and mostly confluent.

In the egg belonging to the same clutch with no. 18, there is a blotch near the butt which measures 20 millimeters by 10 millimeters, or nearly the size of one's thumb-nail. One still nearer the butt is nearly as large; but such markings in the eggs of loons are exceptional, and in any case appear to be formed by several smaller blotches, overlaid by somewhat thinner and very slightly lighter ones.

Loons' eggs are very different from any of those of the *Alcidae* or auks; indeed, in the case of some of the latter, the eggs are pure white, and present no markings of any kind whatever. Moreover, some of the puffins and other species lay but a single egg, although other auks lay two, and, as we know, so do the humming-birds.

These facts are alluded to simply to illustrate the point that the *number* of eggs laid by a bird of one well-defined group, selected as a single characteristic, is by no means a safe one to go by in taxonomy, in the matter of arraying that bird, or family of birds, with another group, simply for the reason that some of the latter assemblage may chance to do the same thing.

Still, in avian classification, the characters presented on the part of eggs always mean something, and such data is often of use in this connection; but it should never be employed as a single factor more than to be additional evidence, with respect to affinities, when associated with what is presented on the part of structure, habits and distribution.

As yet we have not the knowledge which will admit of correctly stating why it is that all loons lay two dark-colored, spotted eggs; but there is a reason for their so doing. And were we able to trace the matter back far enough into the past, that reason could be brought to light. For instance, could we but know what kind of an egg *Hesperornis* and its descendants laid, it would greatly help out.

Washington, D. C., October 13, 1913.

FROM FIELD AND STUDY

A Plea for More Lasting Field Notes.—What happens finally to all the ornithological field notes that are made? A few of them are left to state and local institutions and societies, some to close personal friends of the deceased, and by far the greater majority I imagine, are put away with odds and ends in an old trunk until a house-cleaning by some member of the next generation puts them in the ash barrel. Again, how many of these notes are put and kept in concise, connected and decipherable form so that they may some day be of use to others?

From what I have myself seen I feel safe in venturing the statement that a good percentage of the average men who are interested in birds, other than those connected with some museum or other institution, will find that their old notes are scattered through notebooks of different sizes, and some of them, at least, stored with other old papers where they may be forgotten and at best hard to get at.

Notes that are worth taking at all are worth keeping in orderly condition and